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Notice of Allowability

Application No.

10/604,255

Examiner

Stephen W. Smoot

Applicant(s)

BELYANSKY ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to applicant's amendment received on 07 February 2005.
2. ☒ The allowed claim(s) is/are 1-20.
3. ☒ The drawings filed on 07 July 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

Stephen W. Smoot
Patent Examiner
Art Unit 2813

Stephen W. Smoot

This Office action is in response to applicant's amendment received on 07 February 2005.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Eric W. Petraske on 22 April 2005.

2. The application has been amended as follows:

In the Claims:

In claim 9, line 5, insert --and in direct contact with the sidewalls-- after "trench";

In claim 14, line 4, change "a trench" to --at least one trench--;

In claim 14, line 6, change "trenches" to --at least one trench--;

In claim 16, line 4, change "a trench" to --at least one trench--; and

In claim 16, line 5, change "trenches" to --at least one trench--.

3. Claims 1-20 are allowed.
4. The following is an examiner's statement of reasons for allowance:
 - Claims 1-2, 5-6, 11-15 are allowed because the prior art of record does not teach or suggest, in combination with the other claim limitations, a method of forming a trench capacitor that includes the step of depositing by a spin-on process a sacrificial thermally stable filler material having a molecular weight of greater than 1000 in a trench to define a capacitor top level, combined with the steps of annealing the filler material in an oxidizing ambient and of forming insulating spacers on trench sidewalls above the capacitor top level;
 - Claims 3-4, 7, 10, 16-20 are allowed because the prior art of record does not teach or suggest, in combination with the other claim limitations, a method of forming a trench capacitor that includes the step of annealing sacrificial thermally stable filler material used to define a capacitor top level in an oxidizing ambient at a temperature of less than 500 degrees C, combined with the step of forming insulating spacers on trench sidewalls above the capacitor top level by atomic layer deposition; and
 - Claims 8-9 are allowed because the prior art of record does not teach or suggest, in combination with the other claim limitations, a method of forming a trench capacitor that includes the step of annealing sacrificial thermally stable filler material used to define a capacitor top level in an oxidizing ambient,

combined with the step of forming insulating spacers on trench sidewalls above the capacitor top level, wherein the spacers are formed by depositing a material selected from the group comprising aluminum oxide, hafnium oxide, zirconium oxide, lanthanum oxide, and their silicates.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Huang et al. and Cheng et al. teach methods of forming trench capacitors that feature sacrificial filler material, wherein it is suggested that the filler may be deposited by spinning on a glass.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on M-F (8:00 am to 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SWS